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CENTRAL INTELLIGENCE AGENCY

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S E C R E T

COUNTRY East Germany

REPORT

25X1

SUBJECT Production Costs of a Ship of the
Schwimmbrandwache Class (Coal-fired)

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report giving the cost of material.

in DME and the number of hours of labor required for the construction and fitting-out (excluding engines) of a ship of the Schwimmbrandwache class. (13 pages)

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INFORMATION REPORT

EAST GERMANY
ECONOMIC/NAVAL

Production costs of construction of a ship of the Schwimmbrand-
wache class (Coal-fired). (Dec 1955)

Construction and fitting-out (excluding engines):

<u>1. Miscellaneous</u>	<u>Material Cost in DM(0)</u>	<u>Hours</u>
(a) Blocking and staging.	15,000	21,000
(b) Launching and other services such as docking and towing.	24,000	7,400
(c) Provisional installations for light- ing and heating.	10,000	5,250
(d) Heeling - experiment and tonnage assessment.	-	450
(e) Cleaning work during time of con- struction.	-	24,000
(f) Guarding of the ship during fitting-out.	-	4,960
Total	<u>49,000</u>	<u>63,060</u>
<u>2. Ship construction:</u>		
(a) <u>Ship's body:</u>		
(i) Ship's body constructed in sections and complete velding at estimated weight of 1384 tons.	354,064	242,450
(ii) Bucyancy tests for tanks, body and decks.	700	11,500
(iii) Iron kentledge - 1200 tons	315,000	54,000
Totals for ship's body =	<u>645,700</u>	<u>291,500</u>
<u>3. Equipment:</u>		
(a) <u>Masts, rigging and cargo-handling appliances:</u>		
(i) Foremast with 2 Sampson posts.	6,500	3,450
(ii) 2 derricks, each of 5 tons.	600	350
(iii) 1 derrick of 15 tons.	400	250
(iv) 1 mainmast as signal mast.	1,000	750
(v) Radar mast.	200	280
(iv) Rigging and deck-fittings.	7,500	4,500
(vii) 2 topping winches.	240	150
(viii) Awnings.	1,100	900
	<u>17,540</u>	<u>10,630</u>
(b) <u>Steering gear:</u>		
(i) Rudder with shaft, helm and relieving tackle.	<u>13,600</u>	<u>3,200</u>

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(c) Anchor and hauling equipment:		<u>Material</u> <u>Cost in DM(0)</u>	<u>Hours</u>
(i)	Sheet anchor equipment of 2 anchors each of 2500 kgs and 1 reserve anchor of 2000 kg.	6,300	-
(ii)	2 anchor-chains 52 mm thick and each 275 m in length plus attachments.	100,500	-
(iii)	Release equipment and anchor sleeve and chock.	11,000	1,450
(iv)	Stern anchor equipment: 1 Warp anchor 800 kgs; 1 anchor cable 175 m in length and diameter 32 mm.	950	-
	Anchor davits, nipper, anchor bed and other parts.	700	-
		1,200	630
(v)	Hauling gear:		
	10 roller fairleads.	4,500	600
	13 Tankluesen.	250	390
	18 Bollards.	1,000	1,200
	7 Hawser drums.	350	800
		<u>126,750</u>	<u>5,070</u>
(d) Ship's boats and life-saving devices:			
(i)	2 pairs of self-tipping boat davits with attachments.	4,700	3,400
(ii)	1 pair turntable cutter-davits with attachments.	1,200	400
(iii)	2 pairs boat-chocks with lashings for motorboats.	950	500
(iv)	2 boat winches without motors.	2,900	2,570
(v)	Assorted cases and fastenings for life-saving devices and damage adjustment.	2,000	2,500
(vi)	1 Motor pinnace with cabin.	47,000	7,470
(vii)	1 Motor pinnace without cabin.	45,000	6,670
(viii)	2 Lifeboats (1 with oars).	88,900	40
(ix)	1 working boat.	670	650
(x)	6 Rafts with fastenings.	7,350	90
		<u>201,670</u>	<u>24,290</u>
(e) Doors, windows, etc:			
(i)	138 round porthole windows with storm covers.	48,300	1,650
(ii)	48 square hinged windows with flaps.	13,320	1,200
(iii)	47 doors.	5,650	2,850
(iv)	27 Light steel doors.	1,900	1,250
(v)	60 Manhole covers with rings.	1,500	1,350
(vi)	55 various hatchway covers.	1,650	2,200
(vii)	28 various skylight covers.	<u>3,800</u>	<u>1,300</u>
		<u>76,120</u>	<u>11,800</u>

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	<u>Material</u> <u>Cost in DM(0)</u>	<u>Hours</u>
(f) Stairs, railings etc:		
(i) 26 steel stairways.	900	950
(ii) Various ladders and sea-ladders.	500	750
(iii) Approx 325 running railings for the open decks.	2,250	2,400
(iv) Handrails in the quarters.	100	90
	<u>3,750</u>	<u>4,190</u>
(g) Miscellaneous fittings:		
(i) Flagstaffs, markings on ship's side, fittings for setting of navigation lights.	400	500
(ii) 4 storm ladders.	4,200	5,800
(iii) Other miscellaneous fittings.	<u>2,000</u>	<u>3,800</u>
	<u>6,600</u>	<u>10,100</u>
(h) Ventilating equipment:		
(i) 6 Fans and 1 wall ventilator.	13,200	-
(ii) 24 Centrifugal fans of between 700 and 2400 cu.m/hour.	54,700	-
(iii) 17 uptake ventilators.	6,900	-
(iv) 18 cabin ventilators.	850	-
(v) Approx 1700 running air vents with attachments.	<u>34,150</u>	<u>55,100</u>
	<u>109,800</u>	<u>55,100</u>
(i) Inventory and materials used:		
(i) Inventory for ship's equipment.	124,500	6,700
(ii) Consumable stores.	<u>10,500</u>	<u>-</u>
	<u>135,000</u>	<u>6,700</u>
(j) Testing of equipment.	<u>1,000</u>	<u>4,800</u>
GRAND TOTAL for EQUIPMENT:	<u>691,830</u>	<u>136,180</u>

4. Installations

(a) Cargo holds and store-rooms:		
(i) 21 store-rooms for various purposes:	6,900	4,600
(ii) 6 refrigerator rooms complete.	4,400	2,200
(iii) 3 food store-rooms.	<u>4,200</u>	<u>2,100</u>
	<u>15,500</u>	<u>8,900</u>
(b) Crew's quarters:		
(i) 3 living rooms, 2 bedrooms in polished luxury wood.	10,600	3,300
(ii) 8 single and 5 double cabins in oak.	9,600	4,800
(iii) 17 double cabins in steel plate, 14 4-berth and 1 3-berth cabin in steel plate.	25,000	6,200

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	<u>Material</u> <u>Cost in DM(0)</u>	<u>Hours</u>
(iv) 1 Wardroom for 34 men in steel-plate, 7 wardrooms for 36 men in steel-plate, 8 changing rooms in steel plate.	123,000	41,000
(v) 2 Mess rooms in oak.	7,400	3,700
(vi) Library and reading rooms in steel plate.	<u>5,000</u>	<u>1,420</u>
	<u>180,600</u>	<u>60,420</u>
 (c) Sanitary and Administrative rooms:		
(i) 2 galleys with adjoining rooms.	35,770	3,100
(ii) 2 Pantries	6,500	600
(iii) Bakery installation.	26,900	500
(iv) Laundry, ironing-room and drying-room.	17,400	1,750
(v) Washrooms, showers, bathrooms and toilets.	5,500	3,100
(vi) Sickbay and dental surgery.	<u>10,000</u>	<u>2,500</u>
	<u>102,070</u>	<u>11,550</u>
 (d) Duty rooms:		
(i) Chartroom, wheelhouse and gyro-compass room.	2,200	1,450
(ii) Wireless and radio rooms with 5 rooms for batteries and power units.	4,000	2,000
(iii) 7 workshops.	5,850	4,100
(iv) Telephone exchange.	600	300
(v) Executive offices.	1,850	680
(vi) Alleyways on the whole ship.	<u>1,400</u>	<u>1,400</u>
	<u>15,900</u>	<u>9,930</u>
 (e) Partitions, ceilings, doors and stairways:		
(i) Approx 385 sq.m of partitioning near the berths.	5,400	4,600
(ii) Approx 522 sq.m of light metal ceiling (refrigerator rooms).	23,500	8,600
(iii) Approx 2,875 sq.m of steelplate ceiling.	32,000	50,000
(iv) Approx 2145 sq.m of ceiling in plywood.	32,200	37,100
(v) Approx 245 sq.m of facing in plywood, in some cases covered with linoleum.	3,000	1,310
(vi) Approx 20 sq m of floor covering.	400	250
(vii) 141 doors of light steel plate.	11,000	7,100
(viii) 11 refrigerator room doors.	2,600	600
(ix) 6 internal stairways in oak.	750	600
(x) 15 wooden window frames and 2 panes of clear glass.	3,800	650
(xi) Hatchway covers for stores; coal hatches and cargo battens.	2,200	650
(xii) Various gratings and miscellaneous wooden fittings.	<u>6,500</u>	<u>4,200</u>
	<u>123,350</u>	<u>115,660</u>

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(f) Insulation of rooms, preservation and cementation:	<u>Material Cost in DM(0)</u>	<u>Hours</u>
(i) Approx 4000 sq m of room insulation.	381,910	-
(ii) Derusting and descaling of ship's body.	-	21,000
(iii) Painting of the ship's body and rooms.	65,000	27,200
(iv) Cementing and concreting.	<u>1,500</u>	<u>3,800</u>
	<u>448,410</u>	<u>52,000</u>
(g) Deck covering:		
(i) Approx 100 sq m of wood sheathing for the open decks.	6,300	930
(ii) Approx 1430 sq m magnosil covering.	65,800	2,150
(iii) Approx 1000 sq m wall tiles and linotile.	<u>41,600</u>	<u>2,700</u>
	<u>113,700</u>	<u>5,780</u>
(h) Inventory of constructional fittings:		
(i) Administrative inventory and protective clothing.	76,000	160
(ii) Cabin inventories.	150,000	-
(iii) Inventories for galleys and bakery.	6,500	-
(iv) Inventory for buffet.	3,500	-
(v) Inventories for executive offices and workrooms.	4,500	-
(vi) Medical inventory.	15,000	-
(vii) Sport and culture inventories.	<u>9,500</u>	<u>-</u>
	<u>245,000</u>	<u>160</u>
GRAND TOTAL for INSTALLATIONS =	<u>1,244,530</u>	<u>264,400</u>

Engine Installations:5. Main Engine:

(a) 1 main steam engine with exhaust steam turbine developing 2450 PS at 90 rpm.	785,400	15,530
(b) Line shafting together with shaft tube and propeller shaft.	84,500	15,250
(c) Ship's propeller.	<u>62,000</u>	<u>2,700</u>
	<u>931,900</u>	<u>33,480</u>

6. Auxiliary engines below deck:

(a) Auxiliary engine of the engine room:		
(i) 1 Electro-circulation pump for the main condenser.	14,200	195
(ii) 1 electro-condenser pump for the main condenser.	4,160	155
(iii) 1 electro-circulation pump for the auxiliary condenser.	5,850	140
(iv) 1 electro-condenser pump for the auxiliary condenser.	1,820	50
(v) 1 Auxiliary condenser.	15,090	100
(vi) 1 cover for the electro-motor of the circulation pump.	30	100
(vii) 1 Turbo dynamo 9 kw	75,000	300

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	<u>Material</u> <u>Cost in DM(0)</u>	<u>Hours</u>
(viii) 2 Turbo dynamos, each 150 kw.	165,000	1,200
(ix) 1 Water-cooling pump for turbo-dynamo (SHK 50).	3,260	80
(x) 1 reserve lubricating pump (fitting only as this part is included in payment for main engine).	-	60
(xi) 1 hand pump for dirty oil.	115	15
(xii) 1 oil extractor 200 litre/H.	3,300	25
(xiii) 1 jacket heater for the oil extractor 200 litre/H.	110	60
(xiv) 1 water pre-heater for the oil extractor.	40	30
(xv) 1 Exhaust steam extractor for the auxiliary engine.	.	5
(xvi) 1 vibrating chute for the coke filter.	60	40
(xvii) 1 container for cleaning of condensate 2.7 cu.m	1,360	1,790
(xviii) 1 steam exhaust oil extractor for the main and auxiliary engines.	-	50
	<u>289,395</u>	<u>4,395</u>
(b) Oil tanks and containers:		
(i) 1 oil depositing tank 1.3 cu m.	250	290
(ii) 1 turbine oil rotating tank 6 cu m.	400	480
(iii) 1 tank for dirty turbine oil 1.2 cu m.	250	450
(iv) 1 tank for dirty turbine oil 4.2 cu m.	380	480
(v) 1 storage tank for turbine oil 4.2 cu m.	380	480
(vi) 1 storage tank for engine oil.	140	225
(vii) 1 tank for dirty engine oil 0.5 cu m.	165	265
(viii) 1 storage tank for turbine oil 1.3 cu m.	250	450
(ix) 1 storage tank for cylinder oil .5 cu m.	70	140
(x) 1 high tank for lubricating oil 2.7 cu m.	330	370
(xi) 1 tank for cylinder oil and engine oil used daily 0.032 cu m.	55	85
(xii) 1 collecting tank for separated engine oil 0.16 cu m.	90	80
(xiv) Exhaust steam oil extractors, one for main and one for auxiliary engines. (Fitting only as items are included in cost of main engine.)	-	50
	<u>2,860</u>	<u>4,160</u>
(c) Auxiliary engine and boilers:		
(i) 1 electro feed-pump for boiler.	4,750	50
(ii) 2 Simplex steam feed pumps (DSC 5 25 cu m/H).	12,000	350
(iii) 1 hand pump for filling boiler.	130	10

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	<u>Material</u> <u>Cost in DM(0)</u>	<u>Hours</u>
(iv) 2 filters for water fed to boiler 25 cu m/H (fitting only as cost included under boiler installa- tion complete).	-	45
(v) 1 pre-heater for water fed to boiler 16 cu m/H.	5,850	60
(vi) 1 Evaporator.	17,600	45
(vii) 1 Evaporator/de-aerator.	1,850	25
(viii) 1 Distilling condenser.	4,780	70
(ix) 1 Askania feed water regulator for the evaporator.	1,800	20
(x) 1 set of spares for evaporator.	3,805	-
(xi) 1 Simplex steam piston pump (DSG 1 1.2 cu m/H).	2,700	50
(xii) 1 Dosierbehälter.	<u>60</u>	<u>160</u>
	<u>55,335</u>	<u>885</u>
(d) Machine tools:		
(i) 1 Lathe 1600 SP.L. (DLZ-490)	12,200	160
(ii) 1 Lathe 2500 SP.L. (DLZ-630)	22,100	200
(iii) 1 Universal milling machine FU 250/900.	8,850	150
(iv) 1 Upright drilling machine B 350	1,610	120
(v) 1 Table drilling machine BT 13	1,210	15
(vi) 1 Electrically driven double grinding stand.	<u>610</u>	<u>15</u>
	<u>46,580</u>	<u>660</u>
(e) Fittings in the Engine and Boiler rooms:		
(i) 1 overhead trolley over the gearbox (capacity 2 tons)	130	105
(ii) 1 overhead trolley over the main engine (capacity 3 tons)	165	125
(iii) 1 overhead trolley for the workshop (capacity 1 ton)	90	85
(iv) 4 carrying loops for the auxiliary condenser.	5	15
(v) Floor plates and railings in the shaft tunnel.	750	740
(vi) Floor plates in the engine room.	1,800	2,335
(vii) Stairs and landings in the engine room.	3,570	2,750
(viii) Floorplates in the boiler room.	1,060	1,175
(ix) Stairs and landings in the boiler room.	3,000	1,450
(x) 2 bulkhead sluices.	2,285	3,000
(xi) Engine room overhead lighting.	110	320
(xii) 1 pulley block and tackle with 3 over- head trolleys for the turbo-electro power unit.	150	120
(xiii) 5 bulkhead sluices for the coal bunkers.	<u>3,670</u>	<u>1,640</u>
	<u>16,785</u>	<u>13,860</u>

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	<u>Material</u> <u>Cost in DM(0)</u>	<u>Hours</u>
(f) Auxiliary engines to serve the ship:		
(i) 1 steam bilge pump (B5 106 cu m/H x 4 OWS and spare.	7,800	220
(ii) 1 Fire extinguisher and ballast pump (B5 80 cu m/H x 8 OWS)	7,800	220
(iii) 1 Fire extinguisher pump (B5 80 cu m/H x 8 OWS)	<u>7,800</u>	<u>220</u>
	<u>23,400</u>	<u>660</u>
(g) Auxiliary engines to serve crew:		
(i) 2 sanitary pumps for sea-water and fresh water SHK 50.	6,500	160
(ii) 2 Hydrofor tanks for sea-water and fresh water each 1 cu m.	2,000	100
(iii) 1 hand pump for sea and fresh water.	120	10
(iv) 1 warm water installation giving 6.3 cu m/H.	2,100	80
(v) Heating coil for fresh water tank.	20	20
(vi) 1 Cooling plant for provisions (10,000 K cal)	37,200	105
(vii) 1 cooling plant for provisions (25,000 K cal)	92,800	300
(viii) 1 warm water transfer pump (UP 65)	800	10
(ix) 1 water heater (17 litres)	330	10
(x) 1 water heater (34 litre)	<u>370</u>	<u>10</u>
	<u>142,240</u>	<u>805</u>
(h) Engines of the auxiliary engine room:		
(i) 5 Generators each 260 kw when N=500	255,000	2,000
(ii) 5 Auxiliary diesels 8 DV 136 N - 400 PS/260 kw with 5 air bottles.	470,000	4,000
(iii) 5 Junkers Compressors 8 litres/minute at 230 atmospheric pressures (Type Junkers DK II - from RUSSIA).	306,000	600
(iv) 1 Auxiliary compressor 28.6 cu m/H DFW 37.	7,500	40
(v) 1 electrically driven main water cooling pump SSV 80/290B	5,900	140
(vi) 1 reserve water cooling and bilge pump (electric) SSV 80/290.	5,900	140
(vii) 1 electric fuel loading pump BU 6/2 litres 6.3 cu m/H.	3,000	45
(viii) 2 electric fuel delivery pumps SSV/30/ 290 B 63 cu m/H.	11,800	280
(ix) 1 electric reserve lubricating pump (A5/o AU 4/4 5 cu m/H).	3,600	90
(x) 1 electric old oil delivery pump (BU 6/2 litres 6.3 cu m/H)	1,500	25
(xi) 1 electric distillate conveyor pump 2 SK4	1,250	20
(xii) 1 evaporator; 1 distillate cooler and 1 pre-heater.	25,000	160

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	<u>Material</u> <u>Cost in DM(0)</u>	<u>Hours</u>
(xiii) 5 overhead trolley carriers with trolleys.	500	500
(xiv) 2 blocks and tackle (3 tons)	520	-
(xv) 1 writing desk.	30	20
(xvi) 1 bench and vice.	270	20
(xvii) Parts for electro-diesel room.	<u>4,000</u>	<u>5,000</u>
	<u>1,081,770</u>	<u>13,080</u>
7. <u>Auxiliary engines above deck:</u>		
(a) 1 electric steering gear.	53,500	1,210
(b) 1 electric windlass.	72,200	200
(c) 1 electric capstan, 30 tons.	24,060	120
(d) 2 electric cargo winches, 3 tons	87,100	150
(e) 2 electric cargo winches, 5 tons	105,130	200
(f) 1 emergency power system.	15,690	200
(g) 1 fuel tank for the emergency power system 0.5 cu m.	160	240
(h) 1 water cooling tank for the emergency power system 0.15 cu m.	<u>100</u>	<u>100</u>
	<u>357,940</u>	<u>2,420</u>
8. <u>Boiler installations:</u>		
(a) Boiler and armatures.	999,630	24,720
(b) Cooling installation.	230	12,740
(c) De-clinking installation.	540	3,400
(d) Chimney head.	10	630
(e) Funnel.	3,690	4,950
(f) Rope pull for whistle and tyfon whistle.	<u>840</u>	<u>415</u>
	<u>1,001,940</u>	<u>46,855</u>
9. <u>Pipe lines in the auxiliary engine room:</u>		
(a) 2 sea-boxes.	<u>120</u>	<u>440</u>
(b) Water cooling pipes:		
(i) Approx 205 m of C-pipe from 28 to 150 mm in diameter.	6,660	1,860
(ii) 11 inspection glasses	300	100
(iii) 2 mud boxes	500	
(iv) 4 valves NW 150	1,200	
(v) 31 valves.	<u>2,260</u>	
	<u>10,920</u>	<u>1,960</u>
(c) Lubricating oil pipe-line.		
(i) 1 lubricating oil tank 12 cu m.	600	600 25X1

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	<u>Material</u> <u>Cost in DM(0)</u>	<u>Hours</u>
(ii) 1 old oil tank 7 cu m.	450	500
(iii) 1 tank for lubricating oil in use 30 litres.	30	60
(iv) 1 spindle oil tank 2.5 cu m.	300	360
(v) 1 compressed oil tank 2.5 cu m.	300	360
(vi) Approx 355 m steel piping diameter from 18 to 54 mm.	880	1,730
(vii) 55 Valves NW 32	1,400	-
(viii) 7 hand pumps.	530	-
(ix) 1 Filter NW 40	90	-
	<u>4,580</u>	<u>3,660</u>
(d) Fuel oil pipelines:		
(i) 2 fuel oil tanks each 6 cu m.	900	950
(ii) 1 oil drippings tank 1 cu m.	200	250
(iii) 1 daily-use tank 2 cu m.	280	350
(iv) Approx 330 m of steel piping from 16 to 108 mm diameter.	1,910	3,515
(v) 2 double filters NW 100	420	-
(vi) 2 quantity measures.	300	-
(vii) 50 valves.	2,000	-
(viii) 1 inspection glass	90	-
(ix) 10 remote controls for emergency closing valves (main deck).	400	300
	<u>6,500</u>	<u>5,365</u>
(e) Compressed air pipelines:		
(i) 180 metres steel pipe from 14 to 35 mm diameter.	550	775
(ii) 75 m C - Cu pipe 20 mm 230 ATM	1,000	325
(iii) 40 special unions.	100	400
(iv) 25 high pressure valves NW 12 230 ATM	3,750	-
(v) 10 pressure valves NW 10 30 ATM	500	-
(vi) 6 pressure valves NW 32 30 ATM	600	-
(vii) 15 pressure gauges with valves.	450	-
(viii) 4 compressed air taps with coupling 3/4 ATM.	80	-
(ix) Clips for the air bottles.	250	350
	<u>7,280</u>	<u>1,850</u>
(f) Exhaust gas pipelines:		
(i) 5 silencers NW 150	400	400
(ii) 10 compensators NW 150	200	280
(iii) 5 silencers NW 125	350	370
(iv) 5 compensators NW 125	100	125
(v) 250 m steel pipe from 133 to 159 mm diameter	3,100	4,700

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	Material (Cost in DM(0))	Hours
(vi) 75 m insulated pipe from 133 to 159 mm diameter.	8,700 <u>12,850</u>	<u>5,875</u>
(g) Escape steam and condensation back-flow piping:		
(i) Condensation takeover: Approx 50 m piping 35 mm diameter.	700	230
6 Armaturen NW 32 GBZ	350	-
1 condensation pot.	35	-
(ii) Steam conveyance:		
60 m steel pipe 76 mm diameter.	300	600
60 m insulated steel pipe.	2,300	-
2 steam valves NW 65	270	-
2 steam unions.	<u>50</u>	<u>-</u>
	<u>4,015</u>	<u>830</u>
(h) Distilled water pipelines:		
(i) 1 storage tank 7 cu m.	400	500
(ii) 1 gravity tank 7 cu m.	200	250
(iii) Supply connections and exhaust pipes approx 120 m piping from 28-32 mm dia.	460	500
(iv) 1 hand pump.	75	-
(v) 10 valves.	<u>250</u>	<u>-</u>
	<u>1,385</u>	<u>1,250</u>
10. <u>Pipes for engine parts:</u>		
(a) Live steam tubes approx 385 m pipe between 14 and 219 mm dia.	8,500	5,200
(b) Exhaust pipe lines approx 207 m piping from 25 to 267 mm dia.	8,300	4,450
(c) Drinking water and condensation pipes. Approx 590 m between 9 and 89 mm dia.	22,250	4,500
(d) Lubricating oil and oil separator in- stallation. Approx 280 m piping from 10 to 159 mm dia.	3,300	2,450
(e) Piping for the evaporator. Approx 137 m piping from 38 to 108 mm dia.	960	2,250
(f) Water cooling pipes. Approx 177 m from 28 to 360 mm dia.	14,100	2,800
(g) Escape piping for boiler. Approx 141 m from 18 to 44.5 mm dia.	3,550	1,060
(h) Intake and exhaust steam piping. Approx 293 m from 14 to 18 mm dia.	1,550	870
(i) Pressure gauge piping. Approx 250 m of 9 mm dia.	1,400	570
(j) Insulation of pipes (Done by IKT)	67,650	-
(k) Metal covering of insulated pipes.	600	690
(l) Piping for emergency power system.	<u>750</u>	<u>275</u>
	<u>132,910</u>	<u>25,115</u>

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	<u>Material</u> <u>Cost in DM(0)</u>	<u>Hours</u>
11. <u>Piping for Ship's construction:</u>		
(a) Water fire extinguishing line of approx 45 m (10 valves).	11,350	5,050
(b) Bilge and ballast piping of approx 390 m (30 valves).	10,700	6,000
(c) (i) Washing, sea, warm and drinking water pipes, approx 1500 m.	13,950	5,450
(ii) 275 valves.	3,450	1,950
(d) Drainage and scupper pipes, approx 535 m (125 valves).	8,600	6,750
(e) Air pipes, sounding pipes and filling pipes approx 565 m (34 valves)	5,000	5,350
(f) Steam whistle and sirens (included in cost of boiler).		
(g) Steam fire extinguisher - approx 410 m pipe (16 valves).	2,850	2,350
(h) Steam heating. Approx 2300 m piping, 170 radiators.	56,900	11,000
(i) Speaking tubes. 110 m piping.	1,100	735
(j) Stem log tubes.	880	700
(k) Cooling pipes for cooling engine.	1,250	475
(l) Foam fire extinguisher approx 130 m piping.	5,000	1,780
(n) Anti-freeze piping for stem log tubes.	240	60
	<u>121,270</u>	<u>47,450</u>

12. Inventories and spares:

(a) Inventory	28,500	-
(b) Expendable materials.	8,000	-
(c) Spares:		
(i) Main engine (pistons)	18,630	-
(ii) 1/4 crankshaft.	10,226	-
(iii) Turbine.	14,626	-
(iv) 1/4 Turbine rotor.	22,000	-
(v) Propeller	11,860	1,510
(vi) Propeller shaft and attachments.	12,800	1,010
(vii) Boat windlass	205	60
(viii) Filter body for condensate collector and container.	150	190
(ix) Cooling plant.	7,000	-
(x) Fastenings.	<u>760</u>	<u>2,515</u>
	<u>134,757</u>	<u>5,295</u>

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	<u>Material</u> <u>Cost in DM(0)</u>	<u>Hours</u>
13. <u>Testing:</u>		
(a) Stationary tests:	73,000	22,230
(b) Test run.	13,820	3,575
(c) Clearing of objections.	8,650	4,760
(d) Control of tests and handover.	..	9,100
(e) Handover journey.	5,330	1,390
(f) Miscellaneous.	890	535
(g) Testing of auxiliary engines:		
5 Diesels 400 PS.		
5 Compressors.		
1 Auxiliary compressor.		
10 pumps.	20,000	12,000
(n) 450 tons Diesel oil.	292,500	-
(i) 35 tons motor oil and compressor oil.	87,500	-
	<u>501,690</u>	<u>53,520</u>

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